

ABSTRACT

METHOD AND APPARATUS FOR CONTINUOUS FLOW REDUCTION OF MICROBIAL AND/OR ENZYMATIC ACTIVITY IN A LIQUID BEER PRODUCT USING CARBON DIOXIDE

A continuous method for reducing one or more of microorganisms or enzymes in a liquid beer or wine product, the method comprising the steps of:

- a) forming a pressurized mixture by
 - i) combining a pressurized flow of the liquid beer or wine product with a flow of pressurized liquefied carbon dioxide to create a pressurized mixture in a flow state, the carbon dioxide at a pressure sufficient to maintain it in a liquid state and at a temperature which does not freeze the liquid beer or wine product; or
 - ii) forming a mixture of the liquid beer or wine product with liquid or gaseous carbon dioxide, wherein the carbon dioxide is in the liquid state is at a pressure sufficient to maintain it in a liquid state and at a temperature which does not freeze the liquid beer or wine product, and then pressurizing the mixture;
- b) flowing the pressurized mixture through a reaction zone for a sufficient time to reduce at least one of the microorganisms and the enzymes in the liquid mixture;
- c) feeding the pressurized mixture from the reaction zone through one or more expansion stages wherein the pressure of the mixture flow is decreased to vaporize the carbon dioxide in the mixture; and
- d) applying heat in at least one of the expansion stages to the mixture if necessary, to the extent necessary, to prevent cooling of the carbon dioxide from causing freezing of the liquid product.